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REMARKS

This is a full and timely response to the non-final Official Action mailed May 22, 2007. Reconsideration of the application in light of the following remarks is respectfully requested.

Claim Status:

Claims 19-52 were withdrawn from consideration under the imposition of a previous Restriction Requirement and cancelled without prejudice or disclaimer. New claim 73 has been added. Thus, claims 1-18 and 53-73 are currently pending for further action.

Allowable Subject Matter:

In the recent Office Action, the Examiner allowed claims 17 and 64-72. Applicant wishes to thank the Examiner for the allowance of these claims.

Prior Art:

The sole issue raised in the recent Office Action is a rejection of claims 1-16, 18 and 53-63 under 35 U.S.C. § 103(a) over the combined teachings of U.S. Patent No. 5,281,327 to Honda et al. ("Honda") and U.S. Patent No. 6,059,943 to Murphy et al. ("Murphy") "with evidence from Mesite et al. (US 3,627,859)." (Action of 5/22/07, p. 2). For at least the following reasons, this rejection is respectfully traversed.

Claim 1 recites:

A method of forming an electrolyte, comprising:
removably coupling a perimeter support to a temporary substrate; and
electrodepositing an electrolyte composite film on said temporary substrate.
(Emphasis added).

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According to Applicant's specification, an "electrolyte composite film" includes both electrolytic and structural components, both of which are electro-deposited, as recited in claim 1. As explained in Applicant's specification, "electrolyte composite film includes polymer electrolyte particles, such as perfluorosulfonate ionomer particles, which act as a membrane for conducting ions across a fuel cell. The electrolyte composite film also includes structural particles, such as ceramic particles. The inclusion of structural particles in the electrolyte composite film makes the electrolyte composite film more robust while allowing proper function of the electrolyte composite film." (Applicant's specification, paragraph 0029). Thus, claim 1 recites the electrodepositing of both electrolyte particles and structural particles to form "an electrolyte composite film." In contrast, the current Office Action fails to demonstrate how or where the cited prior art teaches electrodepositing all of the multiple components of an electrolyte *composite* film.

Honda does not teach or suggest a method including any electro-deposition. Rather, Honda teaches electro-polymerization. (Honda, abstract). Moreover, Honda only teaches the formation of a polymer layer from monomer components, not an electrolyte *composite* film. (Honda, abstract). According to Honda,

Disclosed is a method of producing a conductive polymer composite comprising a resin layer and a conductive polymer layer formed on the resin layer, which comprises the steps of dissolving, in a monomer component (a) which is polymerizable without condensation reaction, a monomer component (b) capable of undergoing electrolytic polymerization to give at least one conductive polymer and an electrolyte (c), introducing the resulting solution into an electrolytic polymerization cell, applying a direct current voltage across the cell to electrolytically polymerize the component (b) to thereby provide the conductive polymer layer, and thereafter subjecting the component (a) to polymerization in the cell to provide the resin layer.

(Honda, abstract).

Thus, Honda teaches the electro-polymerization of monomers already in intimate contact with an electrode rather than any electro-deposition as recited in claim 1. (Honda,

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col. 2, lines 60-65). Moreover, Honda merely teaches the formation of a polymer layer, not an electrolyte composite film as recited in claim 1. Consequently, Honda completely fails to teach or suggest the claimed method including “electrodepositing an electrolyte *composite* film on said temporary substrate.” (Emphasis added).

Murphy, on the other hand, does teach the formation of a composite membrane. (Murphy, abstract). However, Murphy also does not teach or suggest any process that includes electro-deposition. At col. 11, line 63 to col. 12, line 51, Murphy lists “a variety of ways” to make a composite membrane. However, none of these methods include electro-deposition. Nor has the Office Action argued that Murphy teaches electro-deposition of the multiple components needed to form a composite film as claimed.

Mesite is cited solely for the teachings the polyvinylidene fluoride “was known to be effect as an electrolyte in fuel cells.” (Action of 5/22/07, p. 2).

Consequently, none of the cited prior art references teach or suggest a method of forming an electrolyte in which electro-deposition is used to deposit, not just a polymer film, but an electrolyte *composite* film composed of both electrolyte and structural components on a substrate.

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present instance, as demonstrated above, the scope of the prior art, as evidenced by Honda, Murphy and Mesite, did not include the claimed method of forming an electrolyte including “electrodepositing an electrolyte *composite* film on said temporary substrate.” (Emphasis added). There is no teaching in the cited prior art of

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electrodepositing the multiple components of a *composite* electrolyte film as recited in claim 1.

Moreover, Applicant's specification describes at length the advantages provided by this significantly different claimed method. For example, "because the above-mentioned process forms the polymer electrolyte material while in an aqueous solution and with little application of heat, the likelihood of dehydration of the polymer electrolyte is reduced. This reduction in the likelihood of dehydration of the polymer electrolyte may reduce the detrimental impact of the re-hydration process of the MEA during operation, specifically in regards to electrolyte layer adhesion, overall mechanical integrity, and susceptibility to fuel crossover." (Applicant's specification, paragraph 0035).

Consequently, because Applicant's claimed method in claim 1 is outside the scope and content of the prior art and provides advantages not recognized or available in the prior art, Honda, Murphy and Mesite cannot support a rejection of claim 1 under § 103 and *Graham*.

In other words, "[t]o establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)." M.P.E.P. § 2143.03. Accord. M.P.E.P. § 706.02(j). Because none of the cited prior art references teach or suggest electrodepositing the multiple components of a *composite* electrolyte film as recited in claim 1, the rejection of claim 1 and its dependent claims should be reconsidered and withdrawn.

Independent claim 57 recites: "A method of forming a fuel cell electrolyte, comprising: disposing a temporary substrate in a solution already comprising polymer units; and electrodepositing said polymer units on said temporary substrate so as to form said fuel

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cell electrolyte on said temporary substrate.” In contrast, the cited prior art fails to teach or suggest this subject matter, and the Office Action fails to indicate how or where the prior art is thought to teach or suggest this subject matter.

Contrary to claim 57, Honda teaches a monomer solution that does not contain polymer units. Honda’s method includes “dissolving, in a monomer component (a) which is polymerizable without condensation reaction, a monomer component (b) capable of undergoing electrolytic polymerization to give at least one conductive polymer and an electrolyte (c).” (Honda, abstract). Honda then teaches introducing electrodes into this solution to conduct electro-polymerization. (*Id.*).

Honda does not teach or suggest a solution comprising polymer units and, therefore, cannot teach or suggest “disposing a temporary substrate in a solution *already* comprising polymer units.” (Emphasis added).

Moreover, Honda does not teach or suggest “electrodepositing said polymer units on said temporary substrate.” According to Honda, “a layer of the polymer produced by the polymerization of component (a) is formed in intimate contact with said conductive polymer layer 6.” (Honda, col. 2, lines 60-65). Honda does not teach or suggest that the second polymer layer “formed in intimate contact” with the first polymer layer is a layer of ions. Moreover, the second layer is not technically formed by electro-deposition as claimed, but rather is formed by electro-polymerizing monomers that just happen to be “in intimate contact” with the previous polymer layer already.

Neither Murphy nor Mesite remedy these shortcomings of the primary Honda reference. As noted above, Murphy does not teach or suggest any method that includes electro-deposition. Thus, Murphy, like Honda, cannot teach or suggest “disposing a temporary substrate in a solution already comprising polymer units; and electrodepositing

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said polymer units on said temporary substrate so as to form said fuel cell electrolyte on said temporary substrate.”

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present instance, as demonstrated above, the scope of the prior art, as evidenced by Honda, Murphy and Mesite, did not include the claimed method of “disposing a temporary substrate in a solution already comprising polymer units; and electrodepositing said polymer units on said temporary substrate so as to form said fuel cell electrolyte on said temporary substrate.”

The cited prior art does not appear to teach a solution that comprises polymer units which are then electrodeposited as claimed. Rather, the cited prior art teaches electropolymerization from a solution containing monomer components, not polymer units. Consequently, there is a significant difference between the scope and content of the prior art as compared to claim 57 which precludes a rejection of claim 57 under § 103 and *Graham* based on Honda, Murphy and Mesite.

In other words, “[t]o establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).” M.P.E.P. § 2143.03. Accord. M.P.E.P. § 706.02(j). In the present case, the cited prior art fails to teach or suggest “disposing a temporary substrate in a solution already comprising polymer units; and electrodepositing said polymer units on said temporary substrate so as to form said fuel cell electrolyte on said temporary substrate.”

Therefore, the rejection of claim 57 and its dependent claims should be reconsidered and withdrawn.

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Additionally, various dependent claims recite subject matter that is further patentable over the teachings of Honda, Murphy and Mesite. Specific, non-exclusive examples follow.

Claim 3 recites "wherein said electrolyte material comprises perfluorosulfonate ionomer particles." The recent Office Action fails to indicate how or where the cited prior art teaches this subject matter. For at least this additional reason, the rejection of claim 3 should be reconsidered and withdrawn.

Claim 9 recites "wherein said metallic material comprises nickel." In contrast, the cited references do not appear to teach or suggest this subject matter, nor has the Office Action cited such a teaching in the cited prior art. For at least this additional reason, the rejection of claim 9 should be reconsidered and withdrawn.

Claim 11 recites "wherein removably coupling said perimeter support comprises depositing a release material on said temporary substrate prior to electrodepositing said electrolyte composite film." The recent Office Action concedes that the cited prior art fails to teach the claimed depositing of a release material. (Action of 5/22/07, p. 4). However, the Action nevertheless concludes that the subject matter of claim 11 is obvious in view of the cited prior art. (*Id.*).

Applicant notes that the Office Action has not indicated where the cited prior art teaches removing a film or membrane from the substrate on which it was formed. Consequently, there is no apparent need in the prior art for the claimed release material. Thus, the Office has failed to demonstrate any teaching of the claimed release material or any need in the art that would lead to the use of the claimed release material. For at least these additional reasons, the rejection of claim 11 should be reconsidered and withdrawn.

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Claim 12 recites "electrodepositing a layer of ions on said electrolyte composite film." This concept is not taught or suggested by the cited prior art. Moreover, the recent Office Action does not appear to address claim 12 or to explain how or where this subject matter is taught by the prior art. For at least these additional reasons, the rejection based on Honda of claims 12, 13, 15 and 16 should be reconsidered and withdrawn.

Claim 14 recites "wherein said layer of ions comprises at least one of perfluorosulfonate ionomers or sulfonate polyetherketones." The recent Office Action fails to indicate how or where the cited prior art teaches this subject matter. For at least this additional reason, the rejection of claim 14 should be reconsidered and withdrawn.

Claim 18 recites "wherein electrodepositing said electrolyte composite film comprises electrophoretic deposition and electrodepositing said layer of ions comprises electrolytic deposition." The recent Office Action fails to indicate how or where the cited prior art teaches this subject matter. For at least this additional reason, the rejection of claim 18 should be reconsidered and withdrawn.

Claim 53 recites "simultaneously electrodepositing electrolyte particles and structural particles to form a single layer of said electrolyte composite film." As noted above, there is no reference of record that teaches or suggests electrodepositing structural particles along with electrolyte particles to form a single layer of an electrolyte composite film. For at least this additional reason, the rejection of claim 53 should be reconsidered and withdrawn.

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Conclusion:


The newly added claim is thought to be patentable over the prior art of record for at least the same reasons given above with respect to the original independent claims.

Therefore, examination and allowance of the newly added claim is respectfully requested.

For the foregoing reasons, the present application is thought to be clearly in condition for allowance. Accordingly, favorable reconsideration of the application in light of these remarks is courteously solicited. If the Examiner has any comments or suggestions which could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the number listed below.

Respectfully submitted,

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